

## Composting : A scientific investigation

### Objectives:

- \*Students will learn that trash is composed of two types of waste: organic and inorganic
- \*Students will learn the difference between a full -loop life cycle and linear life cycle
- \*Students will learn that decomposer such as fungi, microorganisms, and insects are important in the decomposition of organic waste

### Standards:

- 6b. Develop a testable questions
- 6g. Record data by using appropriate graphic representations ( including charts, graphs and labeled diagram) and make inferences based on the data
- 6h. Draw conclusions from scientific evidence and indicate whether further information is needed to support or specific conclusion
- 6i. Write a report on an investigation that includes conducting tests ,collecting data or examining evidence , and drawing conclusion.

1.4. Scientific Inquiry: The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.

1.5. Scientific Inquiry: Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity.

1.6. Scientific Inquiry: The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena

6.1. Systems Thinking: Through systems thinking, people can recognize the commonalities that exist among all systems and how parts of a system interrelate and combine to perform specific functions.

### Materials:

- \* 6 clear jars
- \* at least one "set" of trash
  - an apple core
  - a piece of plastic
  - two leaves from outside
  - a piece of bread
  - a piece of tin or aluminum foil
  - a piece of paper
- \* soil, enough to fill six jars( from outside, not store-bought)
- \* 1 Experiment Data notebook for each student
- \* Each Student will need their science notebook

(Students will see a composting power point ) and provided with a terms definition card  
Introduction:

1. Students will be introduced to the supplies for the project to let them observe, touch, and pick up the objects. Students will get the opportunity to discuss and then answer the following questions:

What do you notice about these objects? Record initial observations of each object.

Is there anything that two or more objects have in common?

Is there anything that makes some of these objects different?

2. The scientific practice of planning and carrying out an investigation. Scientists conduct investigations to understand how the world works, and as students today you will be conducting investigations to see how the objects change. We will be answering the same questions and using the same procedure, but everyone will make their own hypothesis.

#### Procedure- Part One

1. Set up the experiment. Place each trash item in a clean, empty mason jar ( put the trash near the glass so it can be observed)
2. Fill each one of the jars about 1 inch from the top with soil. Make sure the soil is from outside because it will contain the bacteria and microorganisms needed for decomposition. Small insects may be seen in the soil which is helpful.
3. The objects will be left in the soil for seven weeks. We will ask the question again " How do you think these objects will change over time?"( This question will drive your hypothesis) ( Your hypothesis should include how you think it will change record it in your science notebooks)
4. Add a few tablespoons of water to the jar, and keep the lid off. Keep adding water to the each jar if needed to keep it moist but not soaked over the next seven weeks.
5. Each week student will record observations for each trash item in their science notebooks ( noting color, shape, and size of all the objects and sketching)
6. At week seven record final observations . There should be noticeable differences in some of the jars between the first and last week.
7. Students will analyze their data using the information they have gathered over the past seven weeks. Students will choose to either accept or reject their hypotheses and state why?
8. Concluding students will have to summarize what happened over time to each piece of trash and draw a conclusion about different types of trash.  
Which pieces of trash changed the most ? Why ?  
Which didn't decompose at all? Why?  
What made these pieces different?

## Scientific Method Experiment Rubric

Problem - the problem is the question that you are trying to answer.

☐ 2 Points if the problem is written in the form of a question and is a complete sentence with a question mark at the end.

☐ 1 Point if the problem is not written in the form of a question or is an incomplete sentence or is missing the question mark.

Hypothesis - a hypothesis is your educated guess at the answer to the problem.

☐ 2 Points if the hypothesis is written as a guess or explanation to the answer of the problem and in a complete sentence. (I think ..., I hypothesize ..., If.. then...)

☐ 1 Point if the hypothesis is not written in a complete sentence or is not a guess to the problem.

Identifying the Variables and Controls - a variable is the one thing in the experiment that is different in each test. The variable is what you are testing. The controls are the parts of the experiment that are kept the same in each test.

☐ 2 Points if the variable and controls are clearly identified.

☐ 1 Point if only the variable or the controls are clearly identified.

☐ 0 Points if only neither the variable or the controls are clearly identified.

Procedure - the procedure is a step-by-step explanation of how to perform the experiment. To receive all 4 points the procedure must include all of the following:

a. Procedure steps must be numbered

b. Procedure steps must be in the correct order

c. Procedure steps must include instructions on what to measure and where to record the data.

d. Procedure steps must be written in complete sentences.

☐ 4 Points if all four requirements have been met.

☐ 3 Points if only three of the requirements have been completed.

☐ 2 Points if only two of the requirements have been completed.

☐ 1 Points if only one of the requirements have been completed.

Data - the data is the information collected from the experiment. It can be in the form of measurements or observations. Data is usually written in some kind of data table.

☐ 3 Points if the data is organized in a data table or paragraph written in complete sentences. Also, includes more than one trial. All numbers have labels.(cm., ml., g.)

☐ 2 Points if the data is organized in a data table or paragraph written in complete sentences. Only includes one trial or numbers are not labeled.

☐ 1 Point if the data is not organized in a table or paragraph with complete sentences or if only one trial was performed and numbers are not labeled.

Results - the results are the part of the experiment where you analyze the data. This is where calculations are performed and a graph is drawn. (The graph carries its own 10 point grade.)

\_\_\_3 Points if all calculations were completed and a the correct graph type (bar, line, pie) has been drawn.

\_\_\_2 Points if calculations were completed, but not correctly or a graph is drawn, but it is not the correct type.

\_\_\_1 Point if the calculations were not completed or a graph was not completed.

\_\_\_0 Points if the neither the calculations or the graph were completed.

Conclusion - the conclusion is the part of the experiment where you answer the problem. Your answer should also respond to your hypothesis stating whether you were correct or incorrect. A correctly written conclusion must include all of the following:

a. Written in complete sentences.

b. Responded as to whether your hypothesis was right or wrong.

c. Answered the question written in the problem.

\_\_\_ 3 Points if the conclusion includes all three requirements.

\_\_\_2 Points if the conclusion included two out of three requirements.

\_\_\_1 Point if the conclusion included one out of three requirements

\_\_\_0 Points if the conclusion did not include any of the three requirements.

Neatness and Organization - your lab report must be written on a clean and unwrinkled paper. Your handwriting should be clear and easy to read.

\_\_\_ 1 Point if the lab report is clean, unwrinkled, and easy to read.

\_\_\_0 Points if the lab report is stained, wrinkled, or difficult to read